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The Introduction of *Danaida Plexippus* into the Pacific Islands.

[In a letter from Dr. Luther H. Gulick; with additional comments.]

“In 1852, I returned, after eleven years’ absence, to the Sandwich Islands, and my brother John drew my attention to the fact that the so-called American milk-weed (*Aselepias*) had, during my absence, been introduced, and had spread so rapidly as to be already ranked, in that tropic climate, with troublesome weeds. My brother had, early after its introduction, noticed that in whatever part of the group the milk-weed appeared, there also what he called the milk-weed butterfly (*Danaus*) appeared; a butterfly unknown on all the Sandwich Islands till after the introduction of the milk-weed.

“In 1857, a number of choice plants were sent me at Ponape or Ascension Island of the Caroline Range, from Honolulu, by our small missionary brig of about one hundred tons burthen, whose diminutive hold and cabin were several times ransacked in every corner before it reached our island, so that no such butterfly as the *Danaus* could easily have been concealed there. The plants were in glass-covered cases, as closely sealed from the air as it was possible to make them. The vessel sailed from Honolulu on the 24th of June, and reached Ponape, two thousand miles or more from the Sandwich Islands, on the 18th of August, or after fifty-four days, several days after which the case was for the first time opened, thus making a period of about eight weeks from the time of its closure. On the voyage to Ponape, the vessel touched at Apaiang of the Gilbert Islands and Ebon of the Marshall Islands, both low coral atolls, where butterflies of any kind are all but unknown, and at Kusaie or

Strong's Island, which is of basaltic formation and clothed with the most beautiful luxuriance of the tropics, but where, in a general way, I know that neither the above-mentioned milk-weed nor its accompanying butterfly were at that time to be found.

"Some weeks after the plants had been opened on Ponape (I should think it must have been three or four months) there having meantime been no vessel from any other land, we discovered several young plants of the milk-weed, springing up in the earth in which various other plants had been brought from the Sandwich Islands. These milk-weeds had evidently sprung from seeds in the Sandwich Island earth, as we found no plants of that kind after a most careful inspection of every item, when the case first arrived from Honolulu, and as they were plants till then unknown on Ponape, my brother Theodore and I set ourselves to watching whether or not the butterfly would appear with it. The plants did not grow very rapidly or healthily, but just as several of them were beginning to develop flower buds, we discovered a swarm of small caterpillars of the *Danaus*, of different sizes, but none of them apparently more than two or three days out of the egg, feeding on the leaves. This, of course, stimulated our curiosity exceedingly. We had to destroy a considerable portion of the swarm, so as to secure for the remainder nourishment sufficient from the five or six slender and stunted plants to permit of their maturing, for we found that the caterpillars would feed on nothing else. In due time the chrysalids were formed. We took charge of them, showed them to the natives, and offered large rewards to any one who would bring us others of the same kind, but they did not and said they could not, for they were unknown on the island. In about two weeks the butterflies appeared, and we offered like rewards, with like results, regarding them, and as Ponape has but very few butterflies of any kind, we were sure they were something new.

"We afterwards took a few of the seeds of the milk-weed, carefully cleaned, to the opposite side of the island, twenty-five miles as we travelled round the shore, and there planted them. The plants, apparently now naturalized, grew very thriftily to

the height of four or five feet, and after some months the butterfly appeared there also (it was the butterfly, I think, that was first noticed by my friends) and that too, before they had become common on the northeastern side of the island, where they were first propagated, and long before they were found at any intermediate point. I am under the impression that the plant was subsequently introduced at Kusaie, and that the butterfly also appeared there, but of this I am not personally cognizant.

“ Barcelona, Spain, April 17, 1873.”

The above account was furnished by Rev. Dr. Gulick, at my request, for insertion in my work on New England Butterflies; but its special interest induces me to publish it independently. The butterfly in question is a species which abounds over the southern half of N. America and the northern half of S. America, including the intervening islands. In N. America, it is single-brooded (not double-brooded, as asserted by Mr. Riley), the butterfly hibernating. It leaves its winter quarters later in the season than other hibernating butterflies and continues upon the wing until July and August, laying eggs all the time, so that the insect may be found in its earlier stages throughout most of the summer. The eggs are deposited upon the under surface of leaves and hatch in four or five days; the caterpillar attains its full growth in two or three weeks and the chrysalis hangs from nine to fifteen days. The earliest butterflies which have not hibernated may be found in New England in July; so that while the earlier stages are passed rapidly, the perfect insect lives a full year, mingling on the wing with its own progeny and witnessing the decay and renewed growth of the plant which nourished it; for the *Asclepias* dies early and is not sufficiently grown to support the caterpillars of *Danaida* when the first butterflies appear in the spring.

The butterfly has extraordinary powers of flight and has been seen fifteen or twenty miles from land; when several are sporting together they are described as “gyrating in a wild manner at all heights,” some so far up that they appear “but as moving specks in the sky.” But it would be utterly absurd to presume

that this butterfly could have traversed two thousand miles of ocean, and in addition have appeared on an island less than twenty miles in diameter almost simultaneously with a few plants of *Asclepias*, accidentally introduced! The only other alternative is to suppose that it was carried to the island with the box of plants sent to Dr. Gulick. But the precise manner of its introduction is still a perplexing question. In a vast majority of cases the accidental transportation of insects from one country to another is during their preparatory stages; but in this case the voyage is known to have taken nearly eight weeks, while the transformations of the *Danaida*, even in a temperate country, seldom occupy more than four or five weeks, and in the tropics doubtless take less time. So that, should a plant of the *Asclepias* weed, bearing eggs of the *Danaida* just laid, have been accidentally introduced into the Wardian case sent to Dr. Gulick, the butterflies would certainly have appeared in the closed case before the voyage was half over; and we must suppose that the caterpillars from which they were produced had eaten up every trace of *Asclepias*, that the butterflies themselves remained therein unseen for a month, and that at least a pair of them made their escape unnoticed from the case on its arrival at Ponape.

This seems quite impossible. And although Dr. Gulick distinctly says that the "diminutive hold and cabin" of the vessel "were several times ransacked in every corner before it reached our island, so that no such butterfly as the *Danaus* could easily have been concealed there," this seems to be the only other alternative, and one which the long duration of this stage of the insect and its power of extended hibernation directly favor. In this case we must suppose that a pregnant female flew into the hold (to rest for the night) while the vessel was loading at Honolulu and, undergoing a forced imprisonment (or pseudo-hibernation) during the voyage, escaped on unlading and in course of time found *Asclepias* ready for its necessities. A single butterfly, even of the great size of *Danaida Plexippus* would easily escape observation flying at large about a wooded tropical island.

Samuel H. Scudder.